Appendix C. Survey Protocols for Discovery Park

Vegetation Survey Plot Establishment

Project area maps and aerial photographs will be used to locate and install vegetation survey plots. The project area map will have the general vegetation survey plot locations, and will provide road and trail access information. The aerial photographs will be used with the project area maps to approximate the location of each vegetation survey plot on the ground.

Vegetation survey plots will be 0.1 acre and circular in shape. The radius of each plot is 37.25 feet.

Do not install any vegetation survey plots in areas that are inaccessible (deep water, bluffs) or that are wholly or partially on property outside of Discovery Park. The locations of these vegetation survey plots should be adjusted so that the entire plot is on accessible Discovery Park property. Do not install vegetation survey plot centers in streams, or on trails, sidewalks or pavement. The locations of these plots should be adjusted so that the stream, trail, sidewalk or pavement is at least 15 feet offset from plot center.

Do not install a vegetation plot if the randomly-generated plot location does not match the cover type mapped on the Seattle Urban Nature Project (SUNP) cover type map. If the plot center does not match the cover type, re-locate it to the nearest area that conforms to the SUNP map designation, and randomly locate the plot within that area.

The center of the vegetation survey plot will be marked with a 2"x2"x12" wood stake. The stake will be driven into the ground for at least half of its length. Plastic flagging will be tied around the exposed end of the stake, and from a branch at a point approximately 5 feet to 7 feet above the stake. In open, grassy areas, plot center will be marked with a 2"x2"x6" wood stake driven to nearly flush with the ground. No flagging will be tied to or above stakes in open, grassy areas.

Geographic position coordinates will be taken at plot center for each vegetation survey plot. A GPS unit with an accuracy of +/- 10 feet will be used. The data file for each vegetation survey plot center will consist of a minimum of 120 recorded three dimensional positions. The data file will be differentially corrected as Universal Transverse Mercator (UTM) coordinates in meters using the North American Datum of 1964 (NAD 64).

Vegetation Survey Data Collection Requirements

Each vegetation survey plot is 0.1 acre, with a radius of approximately 37.25 feet. Within this area, data will be collected for live trees, shrubs, herbaceous species, bare ground, standing dead trees (snags) and down woody material (DWM).

Borderline Trees

Trees will commonly be growing at the edge of a plot. To determine whether such trees are Ain@ or Aout@ of the plot, measure 37.25 feet from plot center. Determine the Acenter of the tree@, where it enters the ground, perpendicular to a line from the plot center stake to the tree. If the center of the tree is within 37.25 feet, the tree is within the plot and should be tallied. If the center of the tree is beyond 37.25 feet, then the tree is out and should not be tallied.

Vegetation Survey Data Form

Header Information

Provide the following information on the header of the Vegetation Survey Data Form:

- Park Name - Enter ADiscovery Park@
- Plot # - Plot numbers will begin with ADIS@ to indicate Discovery Park, and will be followed by a four-digit plot identification number. Hence, a typical plot number will be ADIS-xxxx@ (example: DIS-0058).
- Name/Date - Enter the first initial and last names of the survey crew, and the date that the data was collected.
- Plot location - Give a brief description of where the plot is located. Example: south of the intersection of Trail A and Trail B.
- Water - Indicate whether there is standing water, saturated soil or no water present.
- Canopy Closure - Indicate the appropriate range of canopy closure (0-40%, 40-60%, 60-80%, >80%), estimated at plot center.
- Soils - Feel the texture of the soil and indicate the general, predominant type of soil (sand, clay, duff, eroded, gravel).
- Aspect - Enter the predominant aspect of the plot. Enter aspect as a three-digit number.
- Slope - Using a clinometer, identify the slope of the plot and indicate the appropriate range (0-15%, 15-40%, >40%).
- Seral Stage - List the seral stage that best applies to the trees within the plot boundaries:
  - 1- old growth - approximately >180 years old
  - 2- late mature - approximately 120-180 years old
  - 3- mid-mature - approximately 60-120 years old
  - 4- early mature - approximately 30-60 years old

- 5- sapling - small trees >1-inch to 5-inch dbh
- 6- shrub pioneer; less than 10% canopy closure

- Special Feature - Indicate whether the plot is in a gully or slide area. Indicate whether Mountain Beaver are present, as evidenced by holes and tunnels. Indicate whether there is a wetland, seep or trail on the plot.

- Comments - Use this space to provide details about the plot, including the approximate size and location of any Special Features. Also provide a brief narrative description of the route taken to the plot center, starting from a readily-recognizable landmark and providing approximate distances and azimuths from that spot.

Tally Requirements

This section gives guidance on identifying and evaluating characteristics of resource information on the Vegetation Survey Data Form.

Dash (-) out all unused data boxes on the Vegetation Survey Data Form within completed line entries. Unused boxes are shaded on Table 1.

Species - Use a four-letter code based on the genus and species of the plant. For example, *Acer macrophyllum* = ACMA. Provide species name for live trees, shrubs and herbaceous species only.

Vegetation Code - Vegetation codes indicate the type of resource information being surveyed, and are used primarily for data analysis. Assign one of the following codes to all resource information items:

- 10 - live trees
- 15 - bare ground
- 20- standing dead trees
- 30 - shrub species
- 40 - herbaceous species
- 70 - DWM >3-inch diameter, and >3 feet long
- 72 - DWM between 0.5 inch and 3-inch diameter, and >1 foot long
- 75 - DWM <0.5 inch diameter, and >1 foot long

Table 1. Vegetation Survey Data Form Tally Guide

Survey Item	Veg. Code	Species	Tree Structure	Crown Class	Percent Cover, or # of pieces	Est. Age	Health	Native, Non-N, Inv.	Regen, Decay Class
Live trees	10	X	X	X		X	X	X	X
Shrubs	30	X		X	X			X	
Herbs	40	X		X	X			X	
Bare Ground	15			X	X				
Snags	20				X				
DWM >3"	70				X				X
DWM 0.5-3"	72				X				
DWM <0.5"	75				X				

Tree Structure - For live trees only, estimate the diameter of the tree at breast height (dbh, 4.5 feet) and indicate the appropriate code:

- 1 - >1- to 4 inch dbh
- 2 – 5- to 8 inch dbh
- 3 – 9- to 20-inch dbh
- 4 – 21- to 31-inch dbh
- 5 - >32-inch dbh, over 40 foot canopy width
- 6 - multi-storied canopy

Crown Class - Estimate the position of the tree in the canopy, or indicate whether the plant is shrub or herb, or presence of bare ground. Use the following codes:

- O - Overstory - trees that form part of the upper canopy
- U - Understory - trees whose upper branches are wholly below the upper canopy
- R - Regeneration - young trees under 3inches dbh and 15 feet height, that are overtopped by older, more-established trees
- S - Shrub species
- H - Herbaceous species
- B - Bare ground

Provide crown class for live trees, shrubs and herbaceous species only.

Percent Cover - Estimate the percent cover of each shrub and herb species, and of bare ground. Use absolute coverage estimates. Total percent cover estimates may exceed 100% as a result of multiple strata. For species with less than 1% cover, enter A00". In this column, also enter the

number of standing dead trees over 1 inch dbh present on the plot, and the number of pieces of down woody material present. Divide DWM into three size classes:

- >3 inch diameter, over 3 feet long
- 0.5 inch - 3" diameter, and >1 foot long
- <0.5 inch diameter, and >1 foot long

Estimated Age - For live trees only, provide an estimate of the tree=s age.

Health - For live trees only, evaluate the health of each tree and indicate one of the following:

- G - Good - Rate trees with the following characteristics as Agood@: robust, straight growth; no broken top; deep to moderate crown; no evident insect or fungal infestations; and no physical damage beyond minor, superficial damage.

- F - Fair - Rate trees with any of the following characteristics as Afair@: minor insect infestations; shallow crowns; minor physical damage, including wounds that expose sapwood; single fungal fruiting bodies on the bole; more than moderate animal damage; minor bole cracks; or less than 15% broken tops. Conifers with leans between 15% and 35% should also be rated Afair@.

- P - Poor - Rate trees with any of the following characteristics as Apoor@: minor to moderate insect damage; extremely shallow crowns; multiple fungal fruiting bodies separated by less than 15 feet on the bole; broken tops exceeding 15% of the bole length; bole cracks that expose heartwood; or severe animal damage (including >70% girdling).

- D - Diseased - Rate trees with any of the following characteristics as Adiseased@: visible interior decay; multiple fungal fruiting bodies separated by at least 15 feet on the bole; or excessive pitching near the base.

Native, Non-Native, Invasive - For live trees, shrubs and herbaceous species, indicate whether the species is Native (N), Non-Native (NN) or Invasive (I). Invasive plant species include:

- *Clematis vitalba* - Wild Clematis (Virgin=s bower)
- *Convolvulus arvensis* - Field bindweed
- *Cytisis scoparius* - Scotch broom
- *Hedera helix* - English ivy
- *Ilex aquifolium* - English holly
- *Phalaris arundinacea* - Reed canary grass
- *Prunus laurocerasus* - Cherry laurel
- *Rubus armeniacus (R. discolor)* - Himalayan blackberry
- *Rubus laciniatus* - Evergreen (cutleaf) blackberry
- *Solanum dulcamara* - Climbing (bittersweet) nightshade

- *Ulex europaeus* - Gorse

Regeneration/Decay Class - for live trees, indicate whether the individual has been planted (P) or is natural (N) regeneration. For DWM over 3inches diameter and over 3 feet long, indicate the decay class of the snag or piece. There are five decay classes, based on the USFS condition codes for DWM. These codes are as follows:

code	**1**	**2**	**3**	**4**	**5**
Bark	intact	intact	trace	absent	absent
Twigs	present	absent	absent	absent	absent
Texture	intact	intact to soft	hard, large pieces	soft, blocky pieces	soft, powdery
Shape	round	round	round	round to oval	oval/flattened
color of wood	original	original	original to faded	light brown to faded brown	faded to light yellow or gray
Bole portion on ground	none, elevated on supports	parts touch, still elevated	bole on ground	partially below ground	mostly below ground